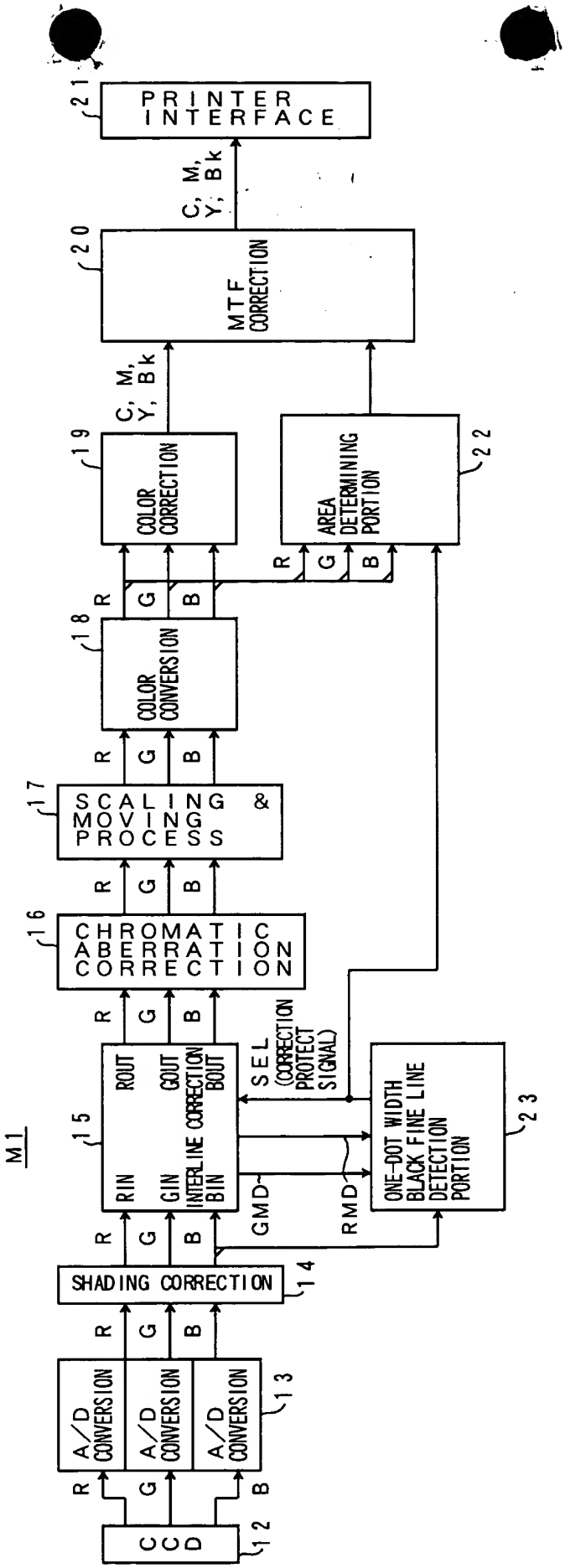

M1
CCD
12
R
G
B
A/D CONVERSION
13
SHADING CORRECTION
14
RIN
GIN
BIN
ROUT
GOUT
BOUT
INTERLINE CORRECTION
15
SEL (CORRECTION PROTECT SIGNAL)
GMD
RMD
CHROMATIC ABERRATION CORRECTION
16
SCALING & MOVING PROCESS
17
COLOR CONVERSION
18
COLOR CORRECTION
19
C, M, Y, Bk
MTF CORRECTION
20
PRINTER INTERFACE
21
AREA DETERMINING PORTION
22
ONE-DOT WIDTH BLACK FINE LINE DETECTION PORTION
23

Fig. 1

Fig. 2

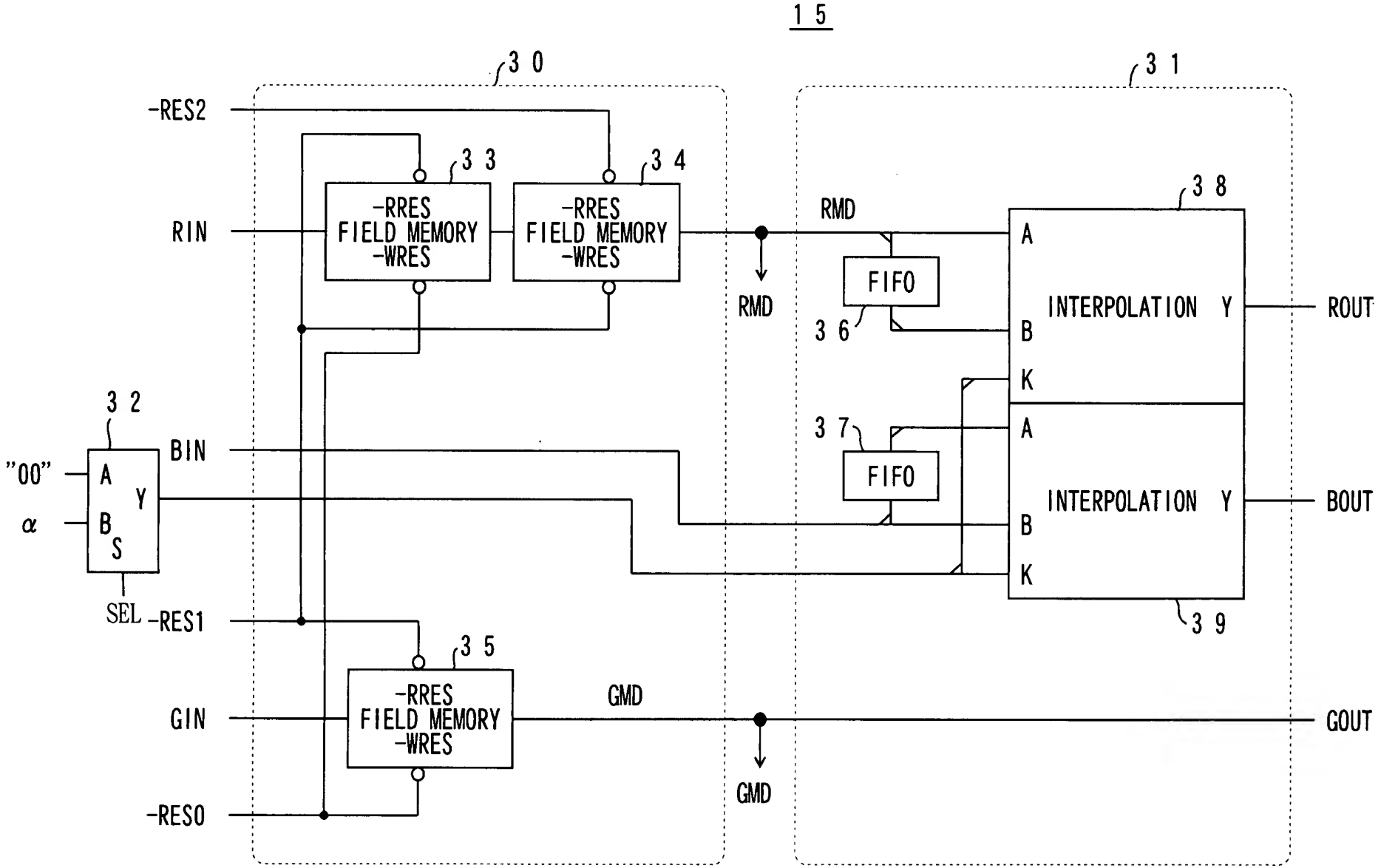

15
30
31
-RES2
RIN
33
-RRES
FIELD MEMORY
-WRES
34
-RRES
FIELD MEMORY
-WRES
RMD
RMD
FIFO
36
38
A
INTERPOLATION Y
B
K
ROUT
32
"00"
α
A
Y
B
S
SEL
BIN
37
FIFO
A
INTERPOLATION Y
B
K
BOUT
39
-RES1
35
-RRES
FIELD MEMORY
-WRES
GIN
GMD
GMD
GOUT
-RES0

Fig. 3

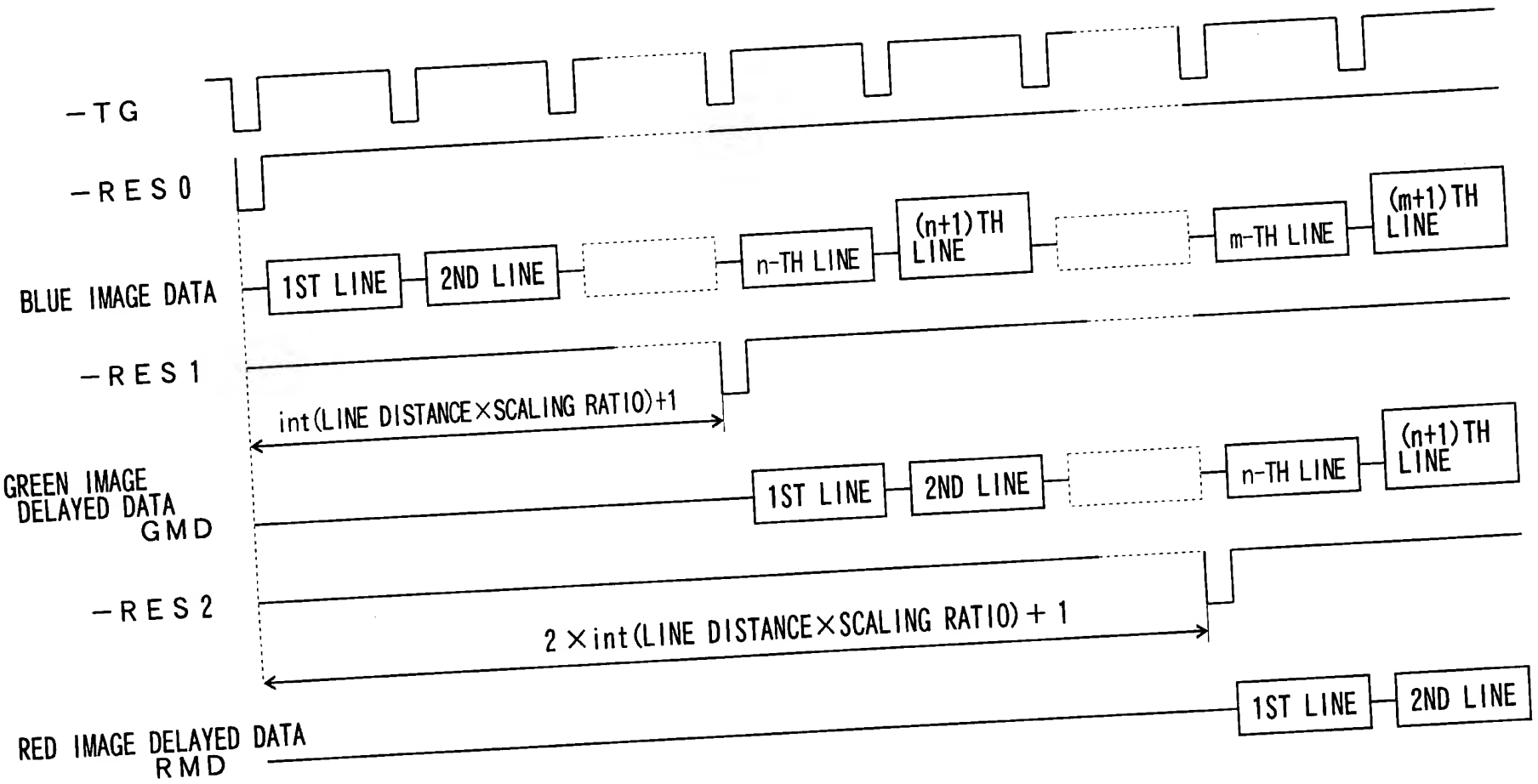

-TG
-RES0
BLUE IMAGE DATA
1ST LINE
2ND LINE
n-TH LINE
(n+1)TH LINE
m-TH LINE
(m+1)TH LINE
-RES1
int(LINE DISTANCE×SCALING RATIO)+1
GREEN IMAGE DELAYED DATA GMD
1ST LINE
2ND LINE
n-TH LINE
(n+1)TH LINE
-RES2
2×int(LINE DISTANCE×SCALING RATIO)+1
RED IMAGE DELAYED DATA RMD
1ST LINE
2ND LINE

Fig. 4

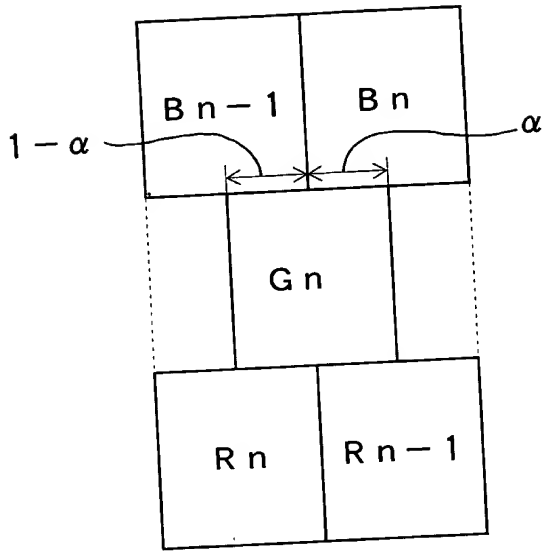


Fig. 5

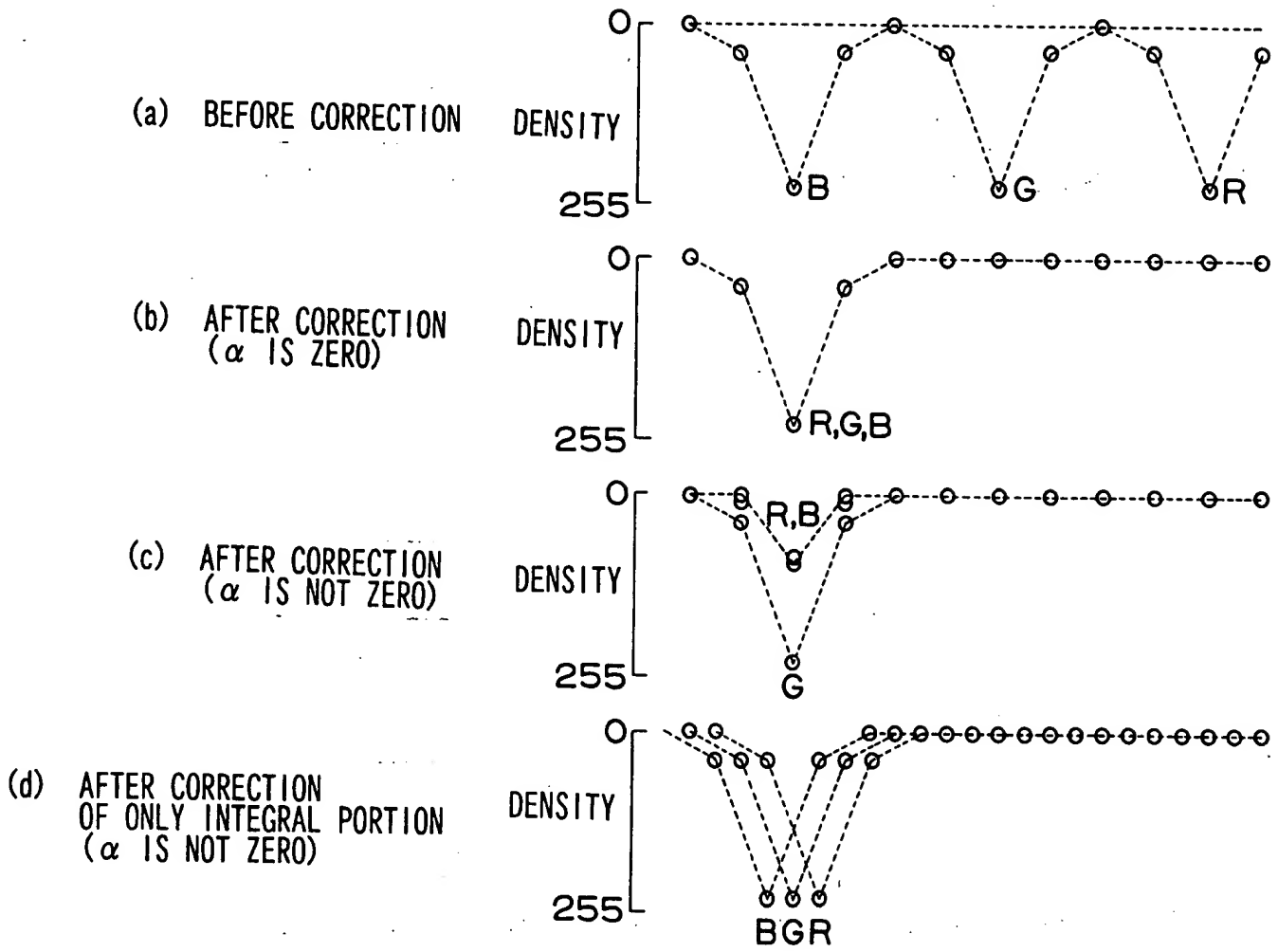

(a) BEFORE CORRECTION
DENSITY
0
255
B
G
R
(b) AFTER CORRECTION
(α IS ZERO)
DENSITY
0
255
R,G,B
(c) AFTER CORRECTION
(α IS NOT ZERO)
DENSITY
0
255
R,B
G
(d) AFTER CORRECTION
OF ONLY INTEGRAL PORTION
(α IS NOT ZERO)
DENSITY
0
255
BGR

Fig. 6

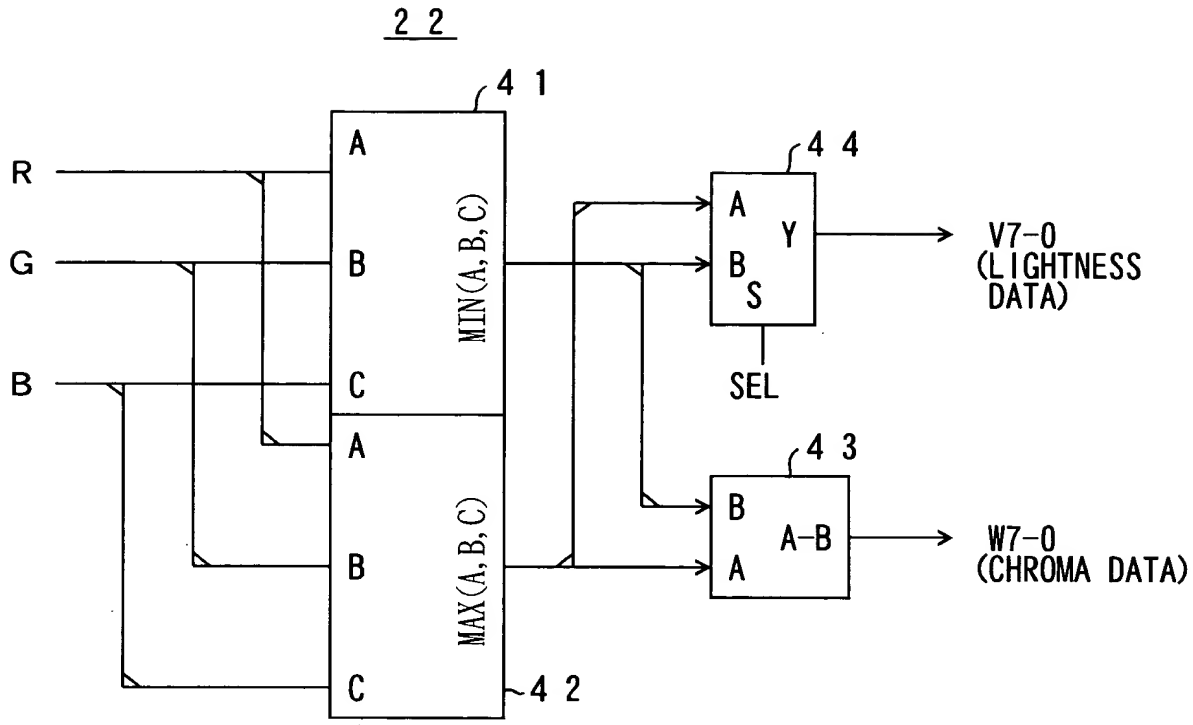

22
41
R
G
B
A
B
C
MIN(A,B,C)
A
B
C
MAX(A,B,C)
42
44
A
B
Y
S
SEL
V7-0
(LIGHTNESS
DATA)
43
B
A
A-B
W7-0
(CHROMA DATA)

Fig. 7

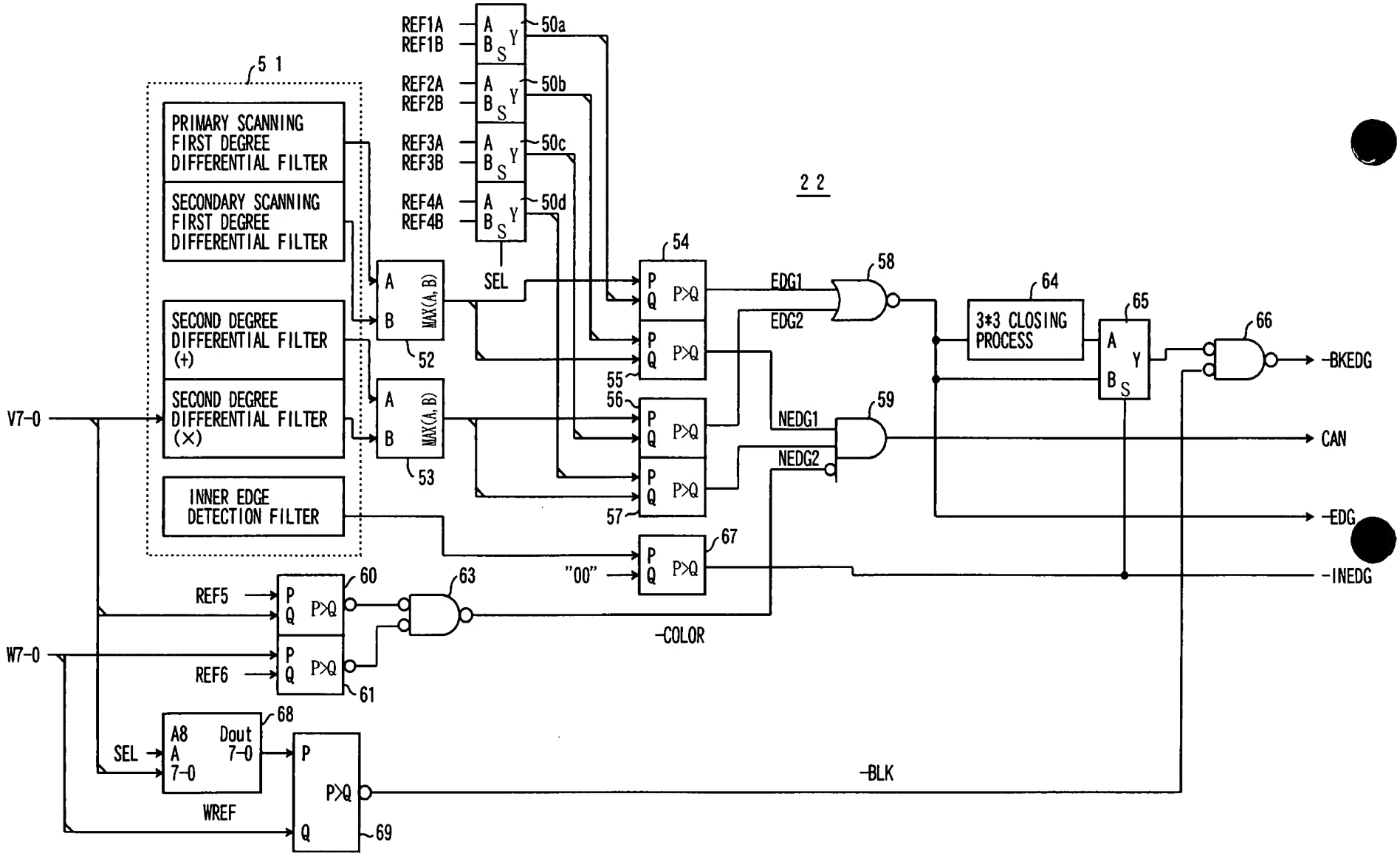

51
PRIMARY SCANNING FIRST DEGREE DIFFERENTIAL FILTER
SECONDARY SCANNING FIRST DEGREE DIFFERENTIAL FILTER
SECOND DEGREE DIFFERENTIAL FILTER (+)
SECOND DEGREE DIFFERENTIAL FILTER (×)
INNER EDGE DETECTION FILTER
V7-0
W7-0
REF1A
REF1B
REF2A
REF2B
REF3A
REF3B
REF4A
REF4B
50a
50b
50c
50d
SEL
MAX(A,B)
52
53
22
54
55
56
57
EDG1
EDG2
NEDG1
NEDG2
58
59
64
3×3 CLOSING PROCESS
65
66
-BKEDG
CAN
-EDG
-INEDG
67
"00"
REF5
REF6
60
61
63
-COLOR
68
A8
A 7-0
Dout 7-0
WREF
-BLK
69

Fig. 8

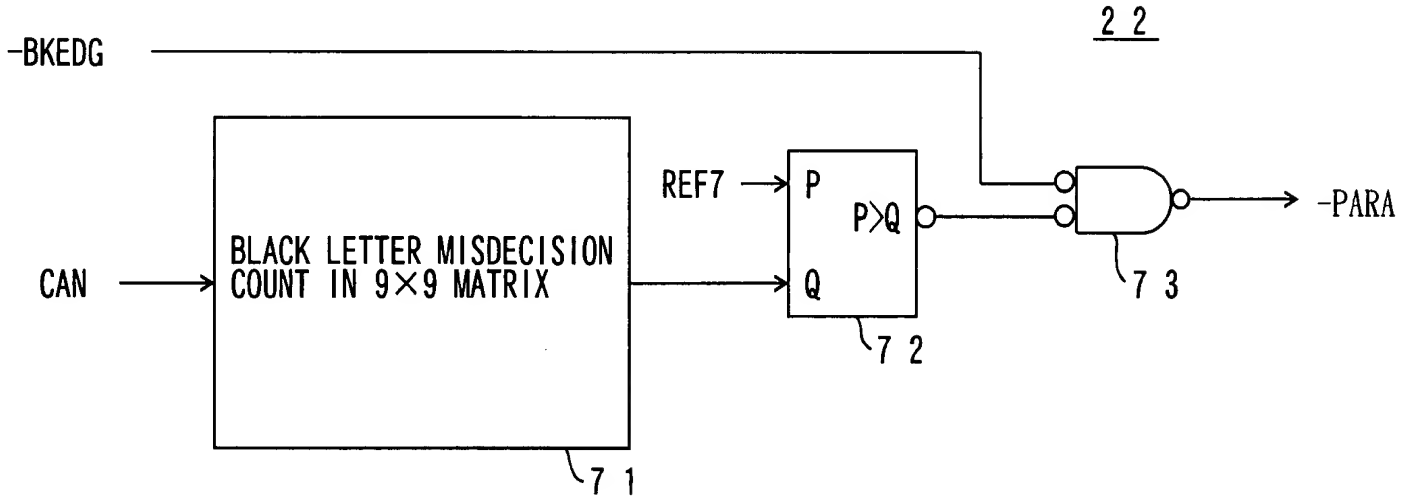
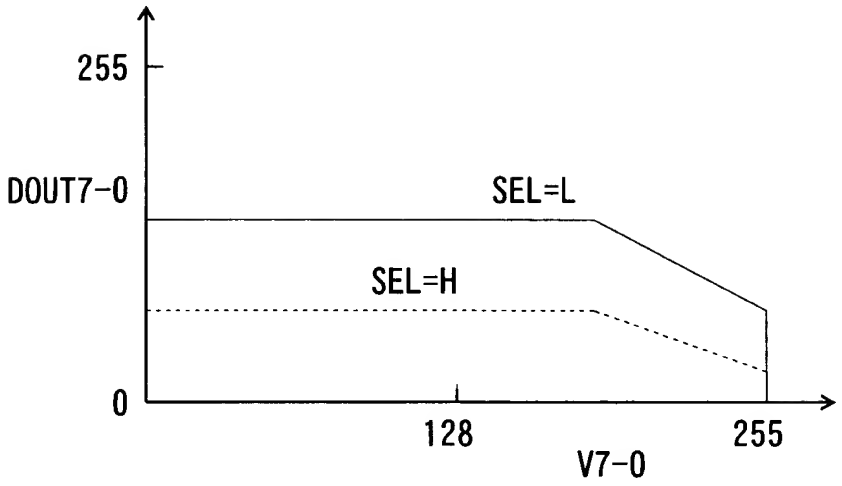

22
-BKEDG
CAN
BLACK LETTER MISDECISION COUNT IN 9×9 MATRIX
71
REF7
P
P>Q
Q
72
73
-PARA

Fig. 9



THRESHOLD AT EDGE PORTIONS

EDGE PORTION	1	REF1A	≧	EDGE PORTION	1	REF1B	
EDGE PORTION	2	REF3A	≧	EDGE PORTION	2	REF3B	
NON-EDGE PORTION	1	REF2A	≦	NON-EDGE PORTION	1	REF2B	
NON-EDGE PORTION	2	REF4A	≦	NON-EDGE PORTION	2	REF4B	

Fig. 10

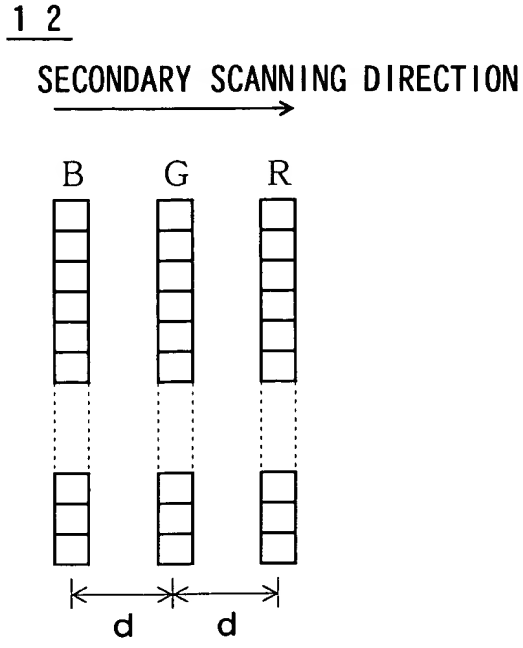


Fig. 11

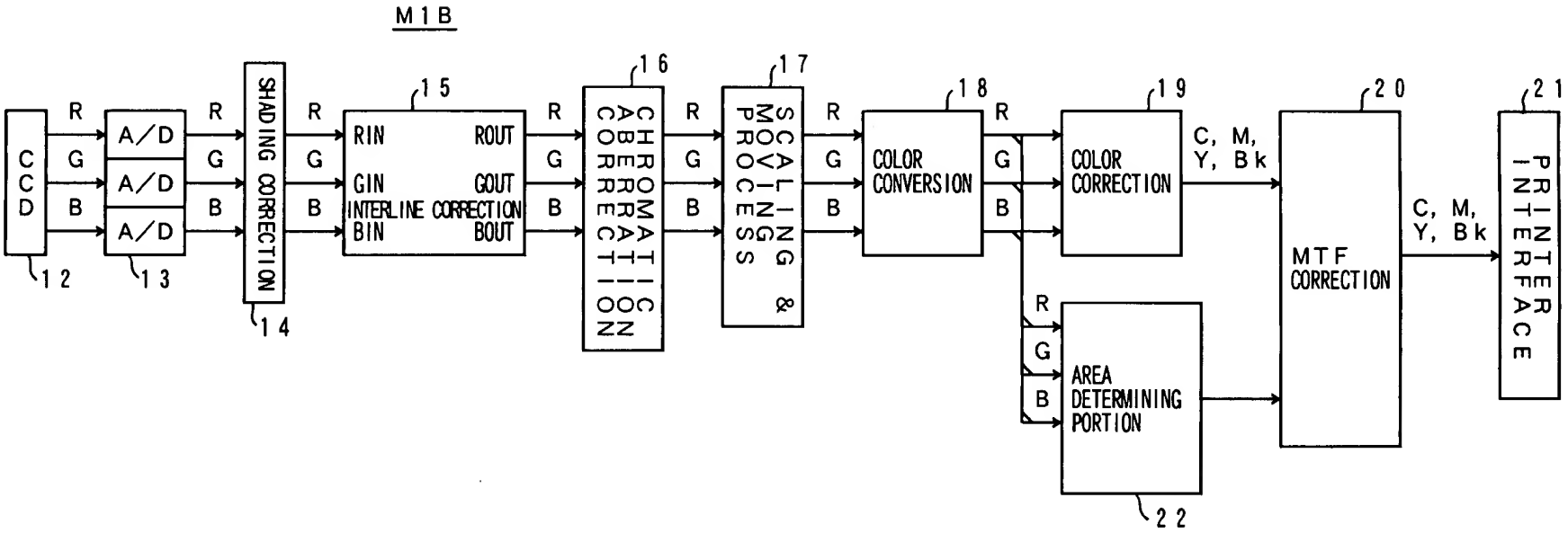

M1B
CCD
A/D
A/D
A/D
SHADING CORRECTION
RIN
ROUT
GIN
GOUT
INTERLINE CORRECTION
BIN
BOUT
CHROMATIC ABERRATION CORRECTION
SCALING & MOVING PROCESS
COLOR CONVERSION
COLOR CORRECTION
C, M, Y, Bk
MTF CORRECTION
C, M, Y, Bk
PRINTER INTERFACE
AREA DETERMINING PORTION
R
G
B
12
13
14
15
16
17
18
19
20
21
22

Fig. 12

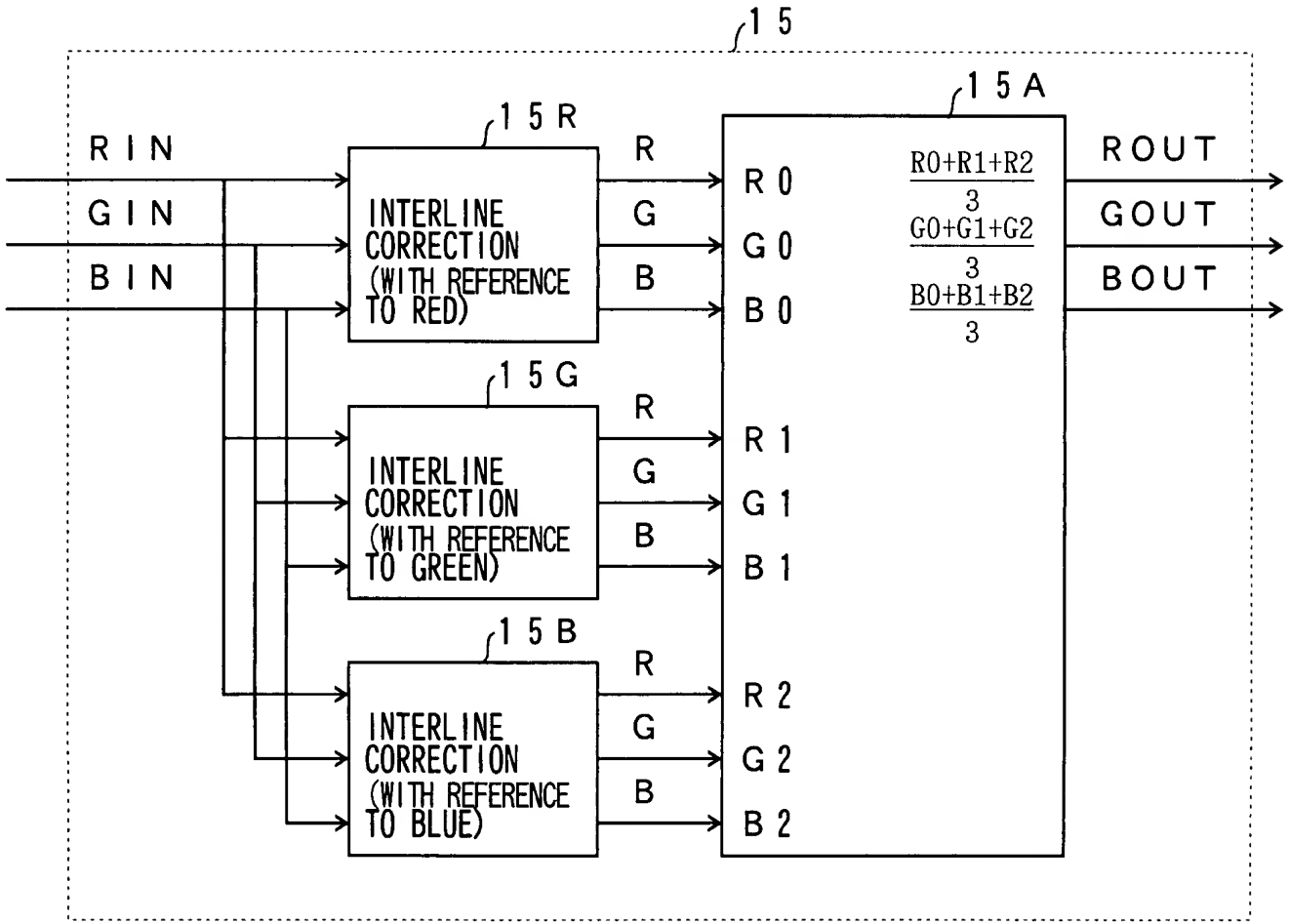

15
15A
15R
15G
15B
RIN
GIN
BIN
INTERLINE CORRECTION (WITH REFERENCE TO RED)
INTERLINE CORRECTION (WITH REFERENCE TO GREEN)
INTERLINE CORRECTION (WITH REFERENCE TO BLUE)
R
G
B
R0
G0
B0
R1
G1
B1
R2
G2
B2
(R0+R1+R2)/3
(G0+G1+G2)/3
(B0+B1+B2)/3
ROUT
GOUT
BOUT

Fig. 13

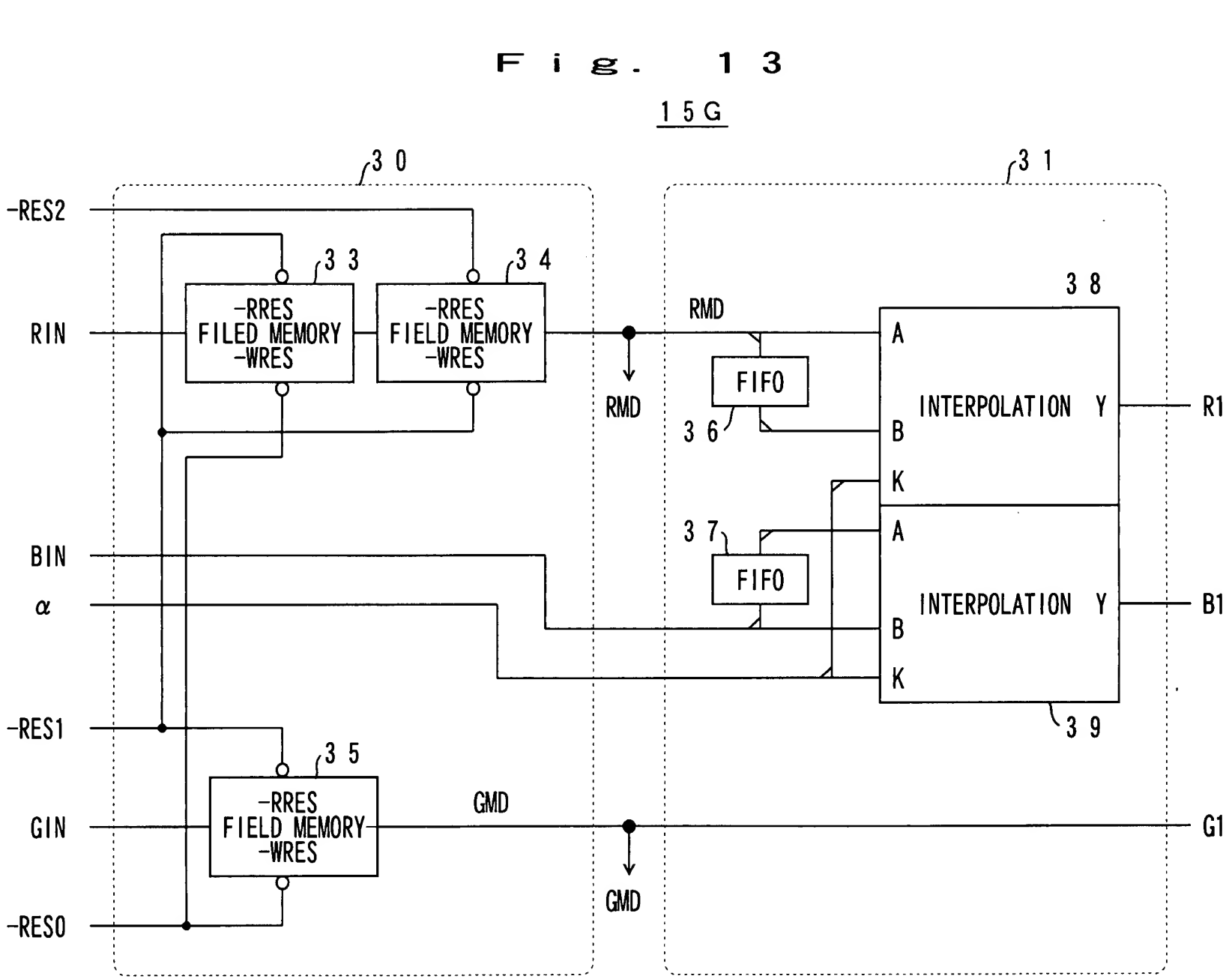

15G
30
31
-RES2
RIN
BIN
α
-RES1
GIN
-RES0
33
34
35
-RRES
FILED MEMORY
-WRES
-RRES
FIELD MEMORY
-WRES
-RRES
FIELD MEMORY
-WRES
RMD
RMD
GMD
GMD
FIFO
36
FIFO
37
38
A
B
K
INTERPOLATION Y
R1
A
B
K
INTERPOLATION Y
B1
39
G1

Fig. 14

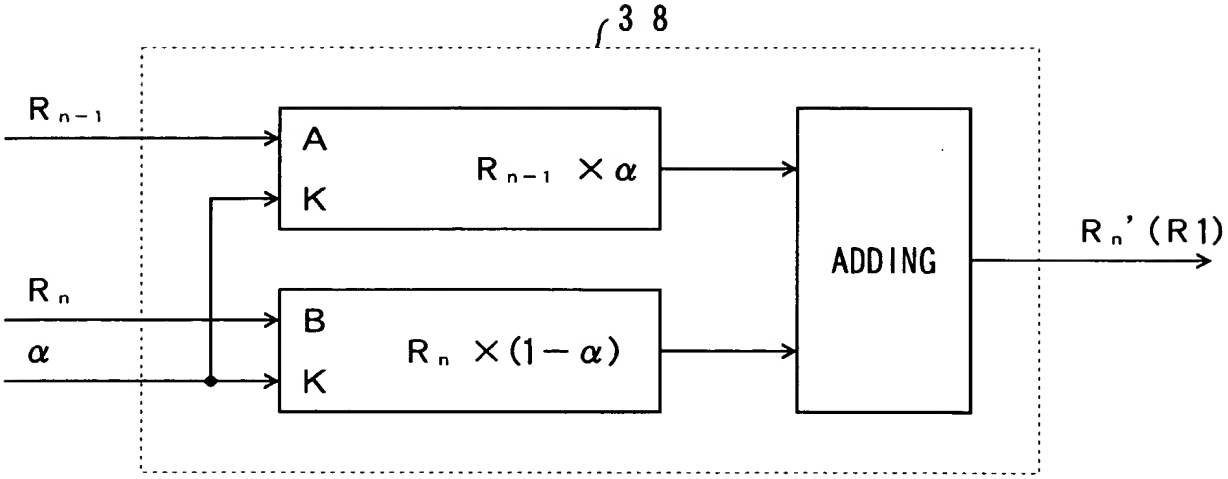

38
R_{n-1}
A
K
$R_{n-1} \times \alpha$
R_n
α
B
K
$R_n \times (1-\alpha)$
ADDING
R_n' (R1)

Fig. 15

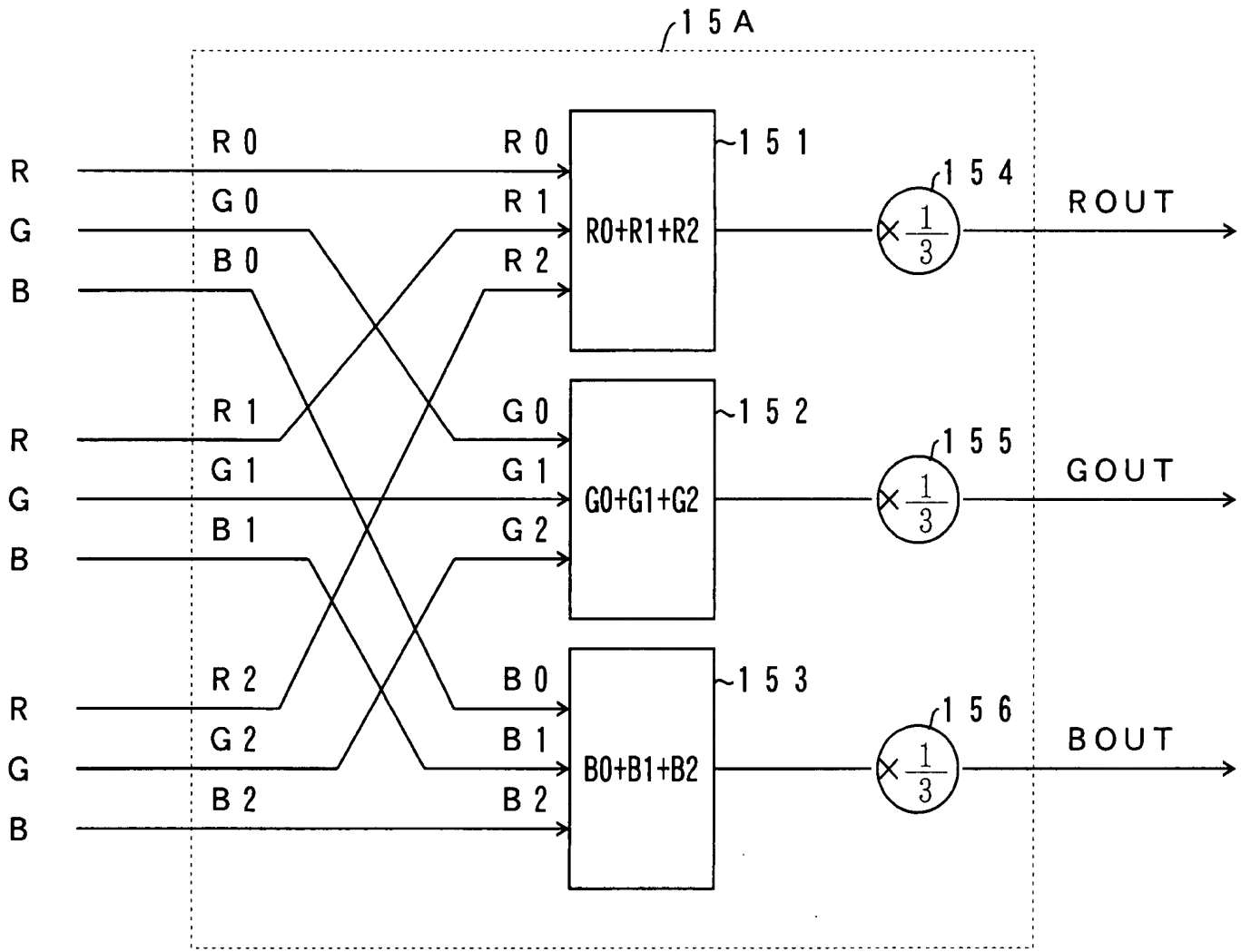

15A
R
G
B
R0
G0
B0
R1
G1
B1
R2
G2
B2
R0
R1
R2
G0
G1
G2
B0
B1
B2
151
152
153
R0+R1+R2
G0+G1+G2
B0+B1+B2
154
155
156
1/3
1/3
1/3
ROUT
GOUT
BOUT

Fig. 16

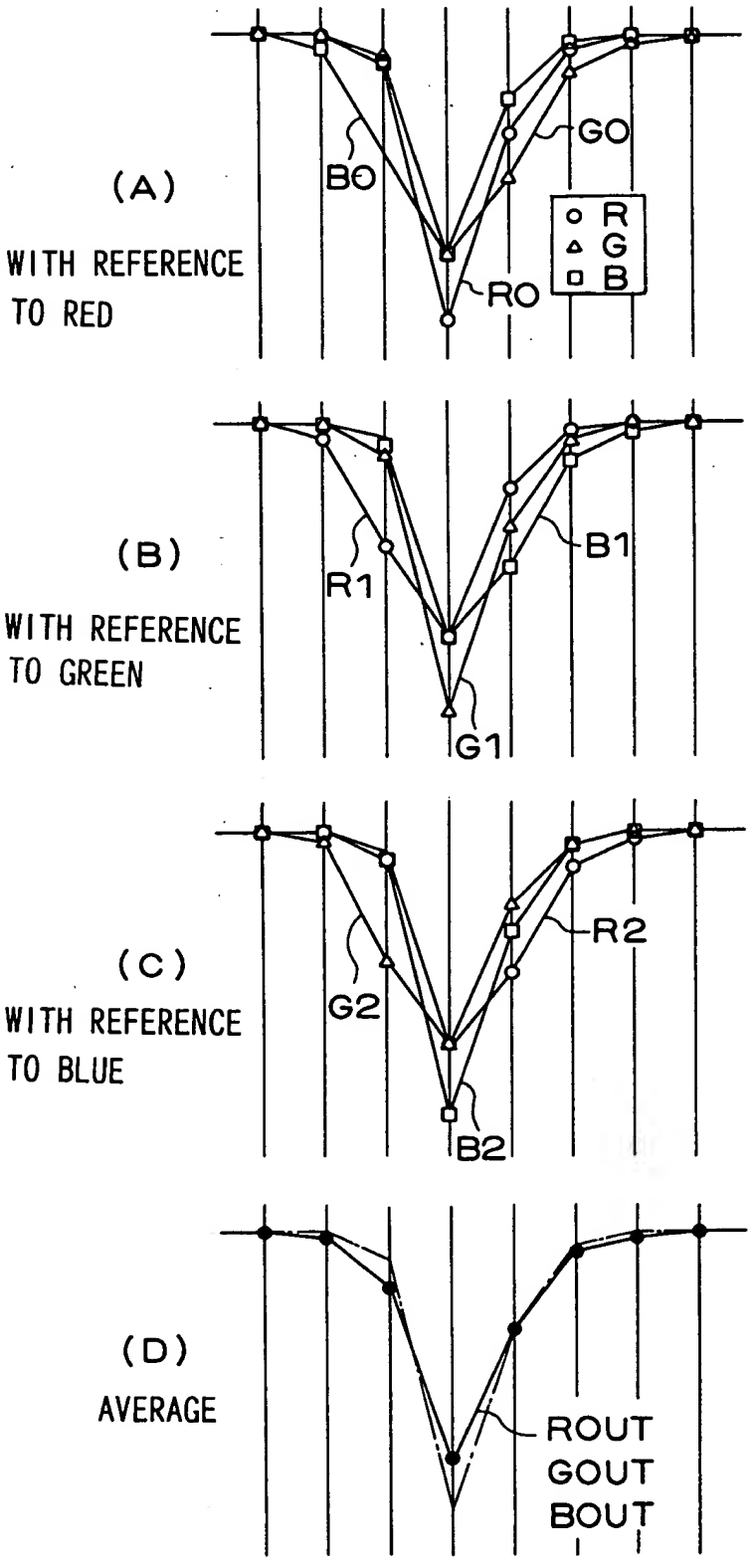

(A)
WITH REFERENCE TO RED
BO
GO
RO
R
G
B
(B)
WITH REFERENCE TO GREEN
R1
B1
G1
(C)
WITH REFERENCE TO BLUE
G2
R2
B2
(D)
AVERAGE
ROUT
GOUT
BOUT

Fig. 17

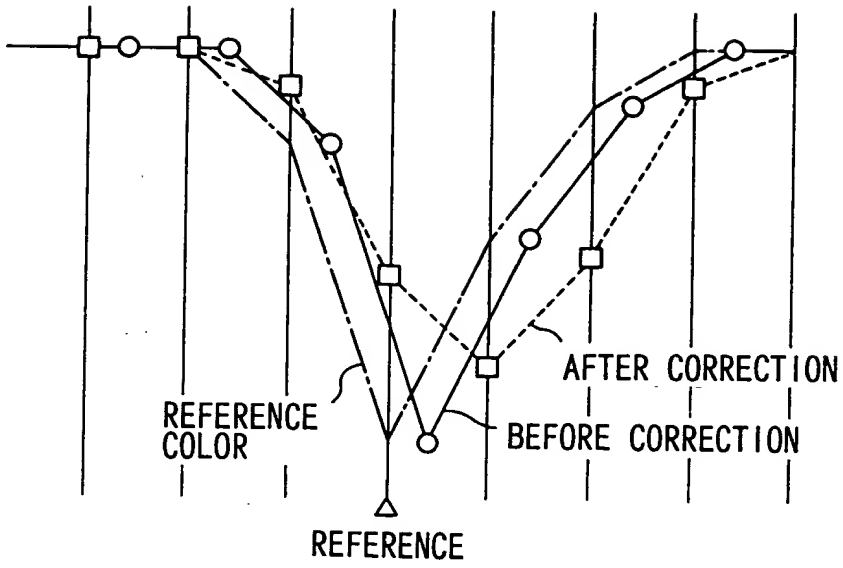

AFTER CORRECTION
REFERENCE
COLOR
BEFORE CORRECTION
REFERENCE

Fig. 18

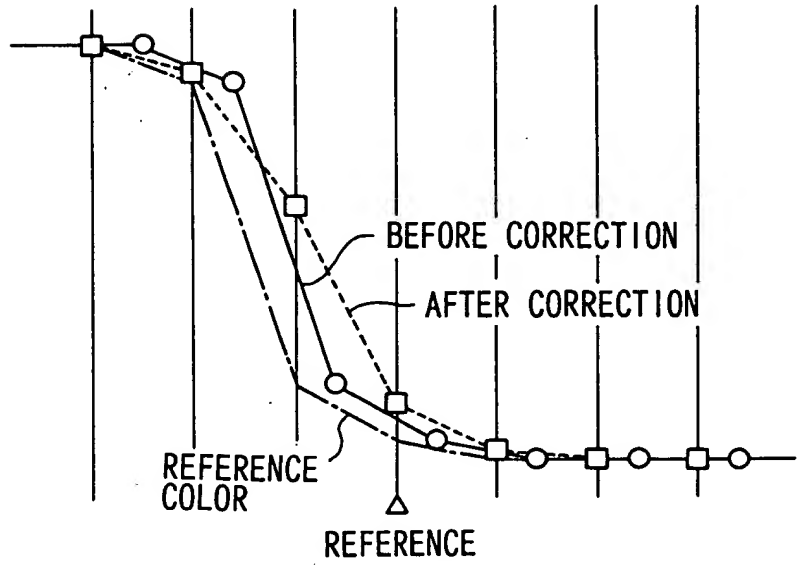

BEFORE CORRECTION
AFTER CORRECTION
REFERENCE
COLOR
REFERENCE

Fig. 19

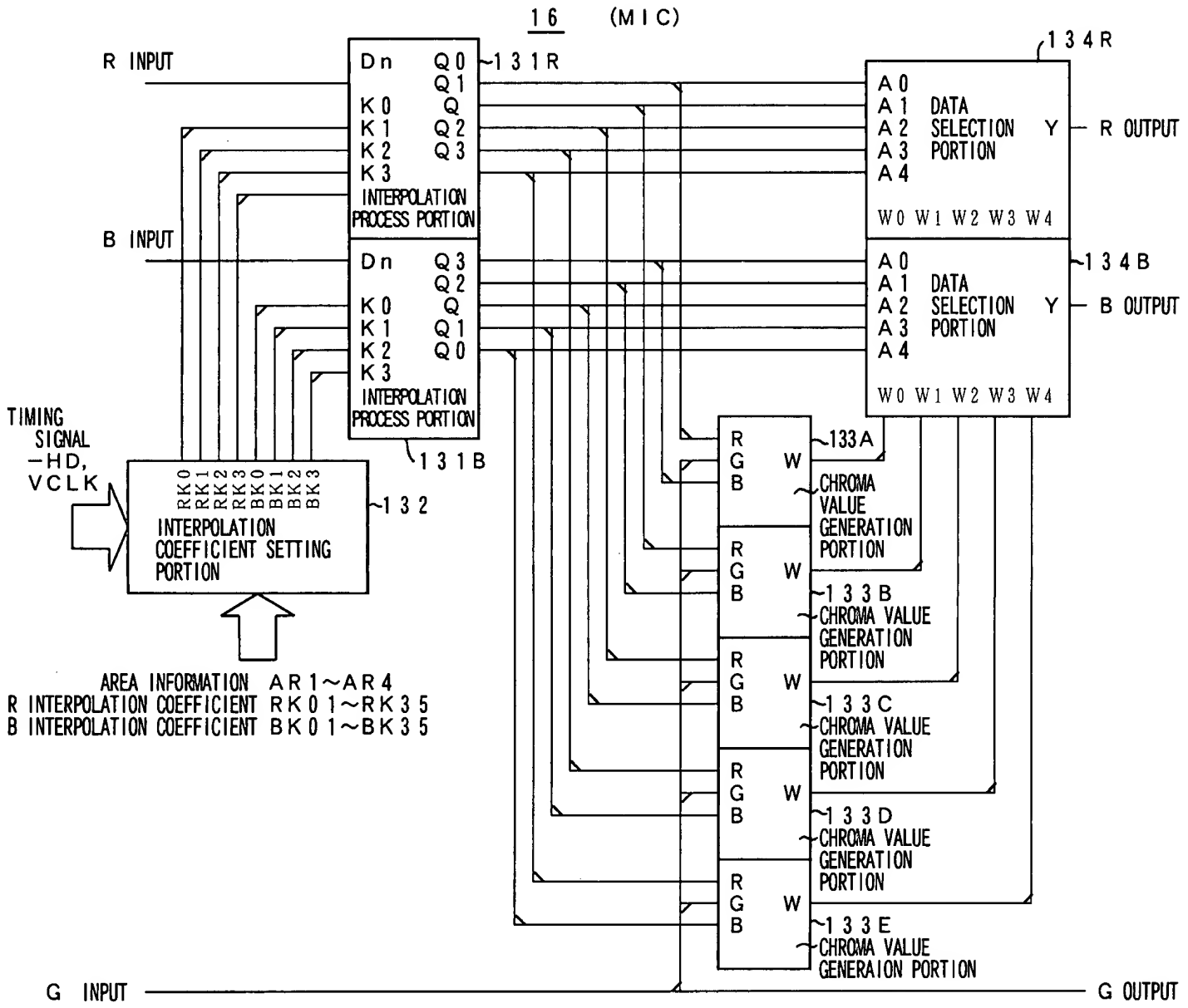

16 (MIC)
R INPUT
B INPUT
G INPUT
Dn Q0 Q1 K0 Q K1 Q2 K2 Q3 K3
INTERPOLATION PROCESS PORTION
131R
Dn Q3 Q2 K0 Q K1 Q1 K2 Q0 K3
INTERPOLATION PROCESS PORTION
131B
134R
134B
A0 A1 A2 A3 A4
DATA SELECTION PORTION
Y
W0 W1 W2 W3 W4
R OUTPUT
B OUTPUT
G OUTPUT
TIMING SIGNAL -HD, VCLK
RK0 RK1 RK2 RK3 BK0 BK1 BK2 BK3
INTERPOLATION COEFFICIENT SETTING PORTION
132
R G B W
133A
CHROMA VALUE GENERATION PORTION
133B
133C
133D
133E
AREA INFORMATION AR1~AR4
R INTERPOLATION COEFFICIENT RK01~RK35
B INTERPOLATION COEFFICIENT BK01~BK35

Fig. 20

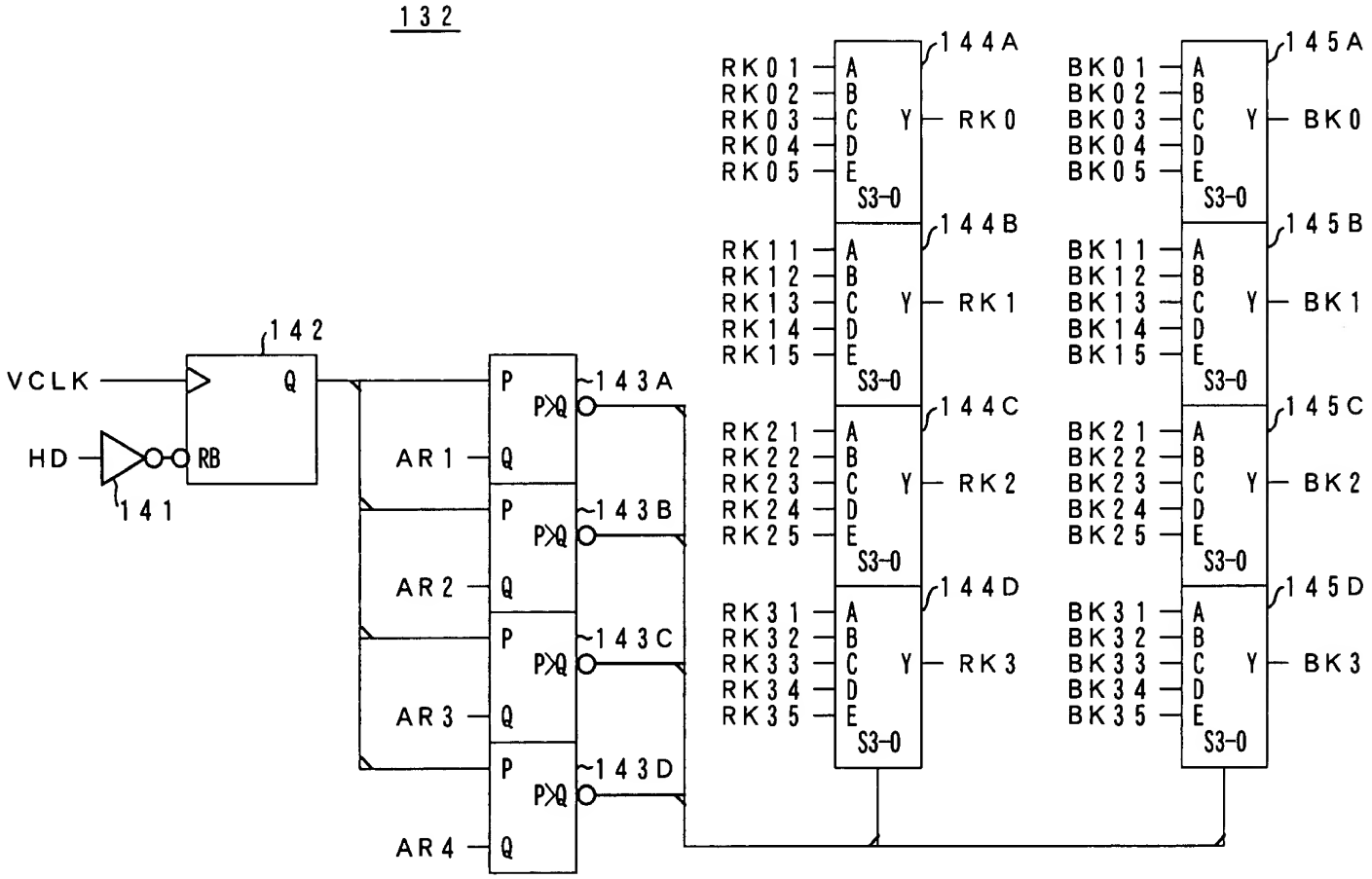

132
142
VCLK
HD
RB
Q
141
AR1
AR2
AR3
AR4
P
P>Q
Q
143A
143B
143C
143D
144A
144B
144C
144D
RK01
RK02
RK03
RK04
RK05
RK11
RK12
RK13
RK14
RK15
RK21
RK22
RK23
RK24
RK25
RK31
RK32
RK33
RK34
RK35
A
B
C
D
E
Y
S3-0
RK0
RK1
RK2
RK3
145A
145B
145C
145D
BK01
BK02
BK03
BK04
BK05
BK11
BK12
BK13
BK14
BK15
BK21
BK22
BK23
BK24
BK25
BK31
BK32
BK33
BK34
BK35
BK0
BK1
BK2
BK3

Fig. 21

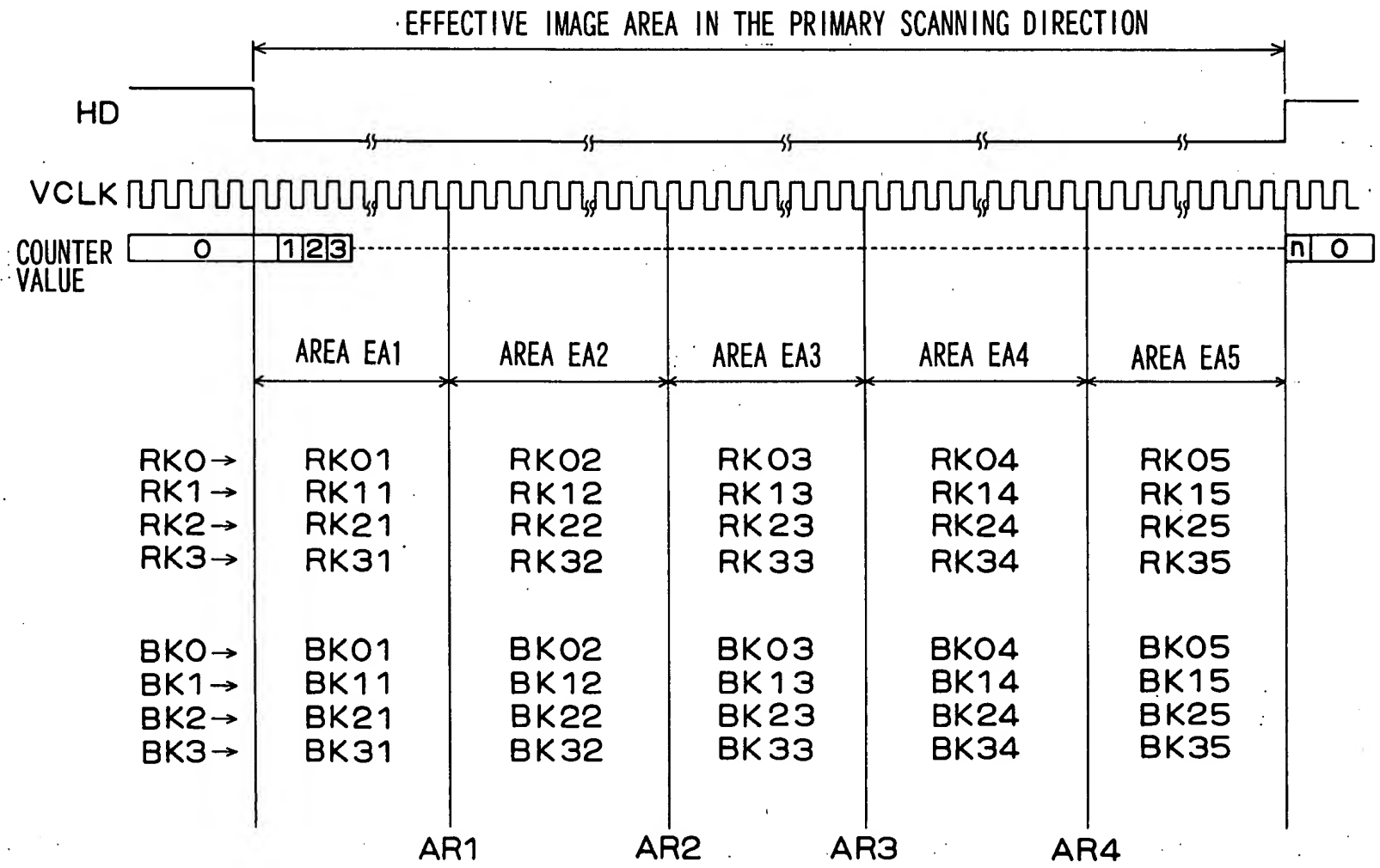

EFFECTIVE IMAGE AREA IN THE PRIMARY SCANNING DIRECTION
HD
VCLK
COUNTER VALUE
0
1 2 3
n 0
AREA EA1
AREA EA2
AREA EA3
AREA EA4
AREA EA5
RK0→ RK01 RK02 RK03 RK04 RK05
RK1→ RK11 RK12 RK13 RK14 RK15
RK2→ RK21 RK22 RK23 RK24 RK25
RK3→ RK31 RK32 RK33 RK34 RK35
BK0→ BK01 BK02 BK03 BK04 BK05
BK1→ BK11 BK12 BK13 BK14 BK15
BK2→ BK21 BK22 BK23 BK24 BK25
BK3→ BK31 BK32 BK33 BK34 BK35
AR1
AR2
AR3
AR4

Fig. 22

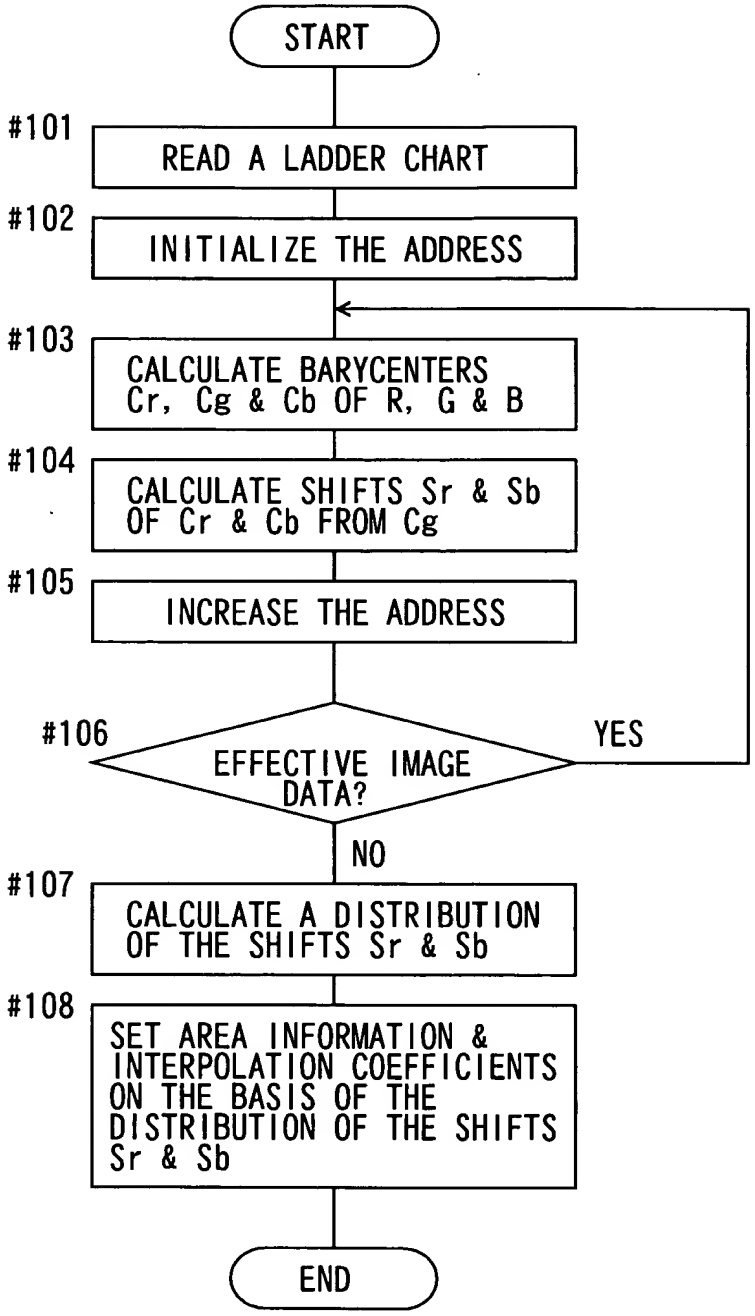

START
#101
READ A LADDER CHART
#102
INITIALIZE THE ADDRESS
#103
CALCULATE BARYCENTERS Cr, Cg & Cb OF R, G & B
#104
CALCULATE SHIFTS Sr & Sb OF Cr & Cb FROM Cg
#105
INCREASE THE ADDRESS
#106
EFFECTIVE IMAGE DATA?
YES
NO
#107
CALCULATE A DISTRIBUTION OF THE SHIFTS Sr & Sb
#108
SET AREA INFORMATION & INTERPOLATION COEFFICIENTS ON THE BASIS OF THE DISTRIBUTION OF THE SHIFTS Sr & Sb
END

Fig. 23

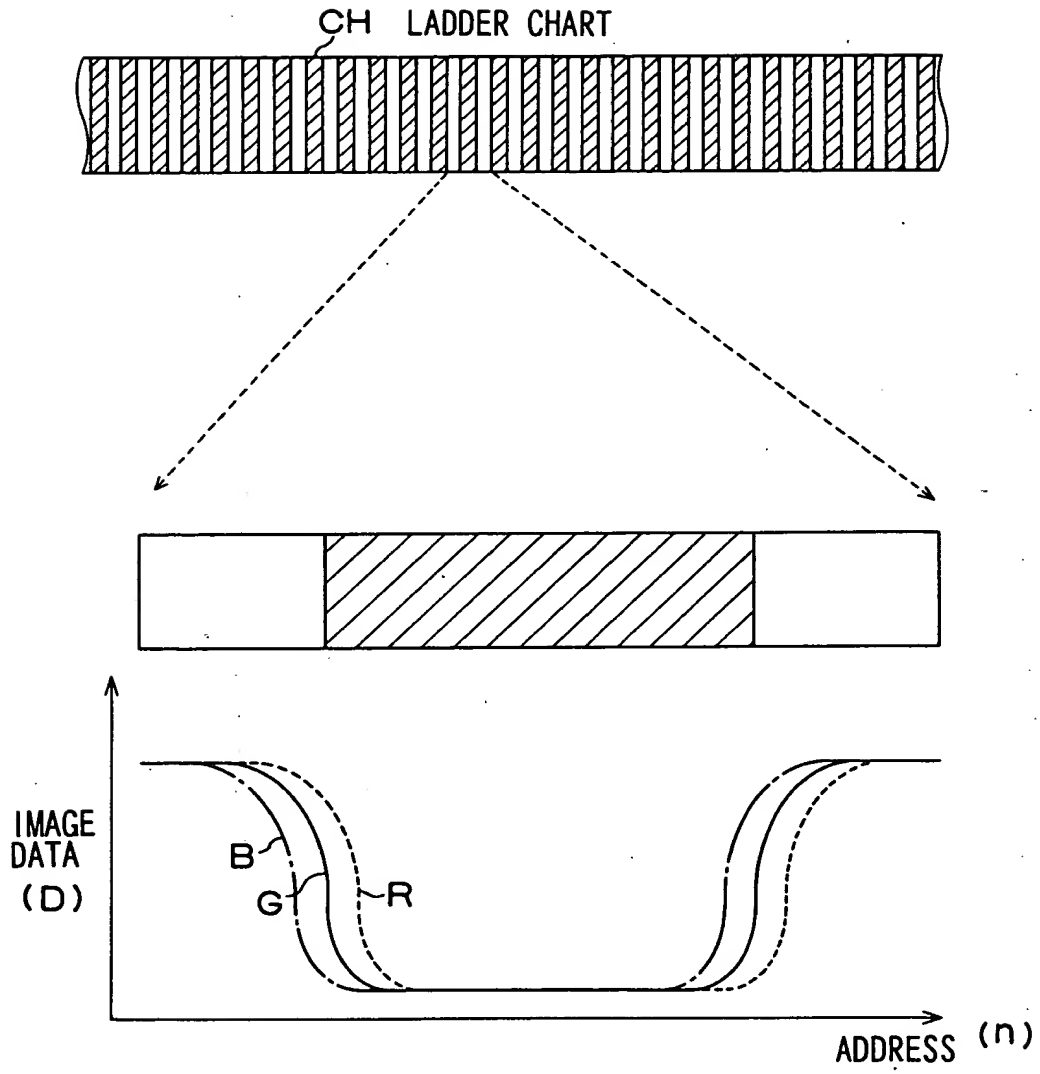


Fig. 24

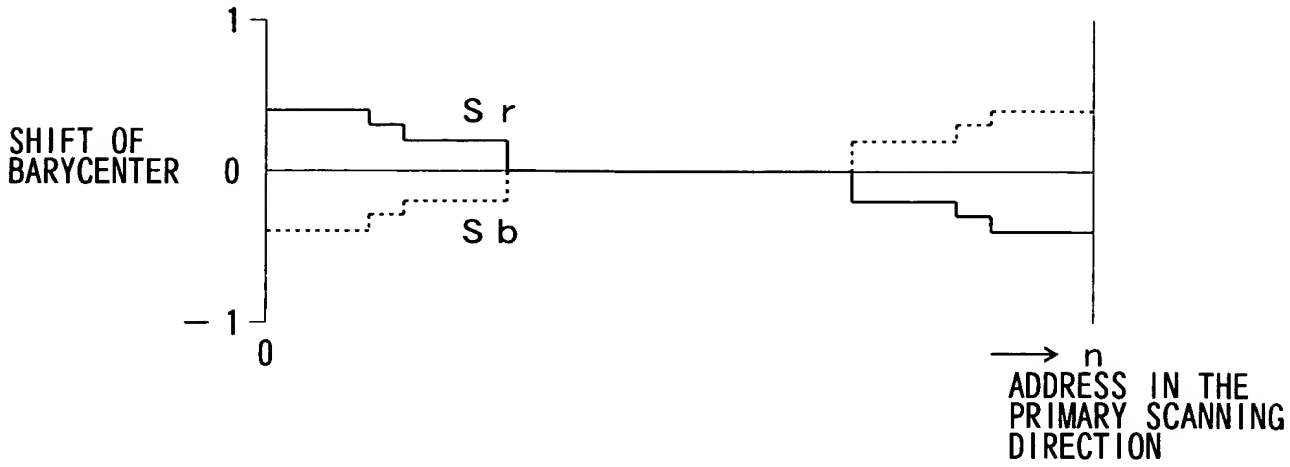

1
0
−1
SHIFT OF BARYCENTER
Sr
Sb
0
n
ADDRESS IN THE PRIMARY SCANNING DIRECTION

Fig. 25

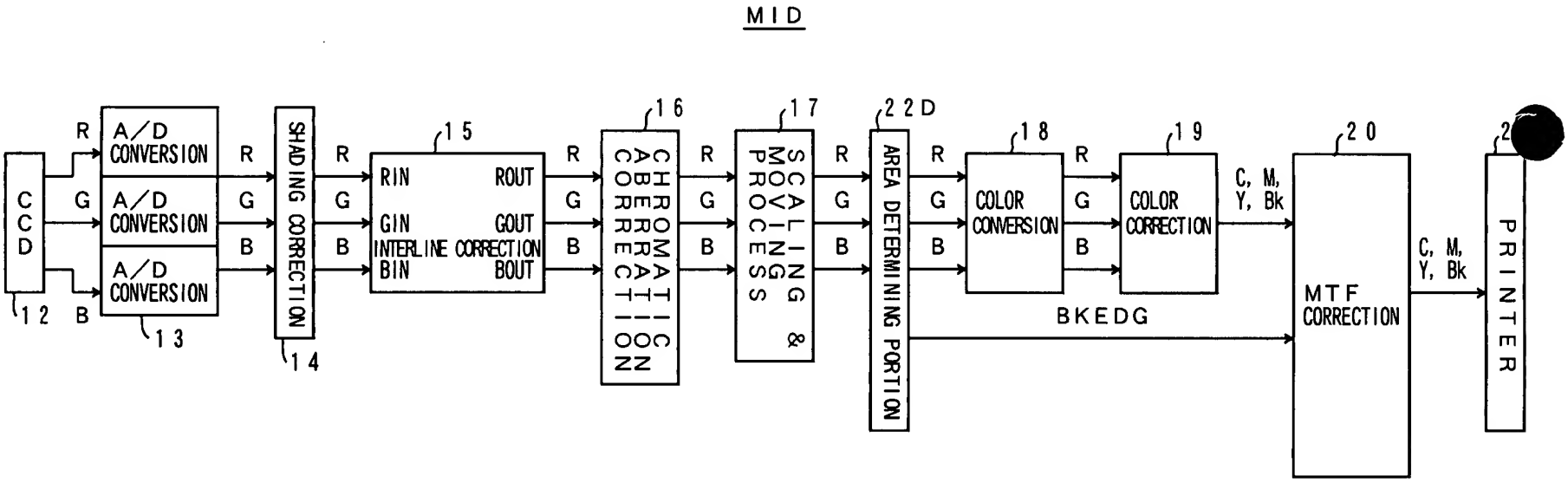

MID
CCD
R
G
B
12
A/D CONVERSION
A/D CONVERSION
A/D CONVERSION
13
SHADING CORRECTION
14
15
RIN
ROUT
GIN
GOUT
INTERLINE CORRECTION
BIN
BOUT
16
CHROMATIC ABERRATION CORRECTION
17
SCALING & MOVING PROCESS
22D
AREA DETERMINING PORTION
18
COLOR CONVERSION
19
COLOR CORRECTION
C, M, Y, Bk
20
MTF CORRECTION
C, M, Y, Bk
PRINTER
BKEDG

Fig. 26

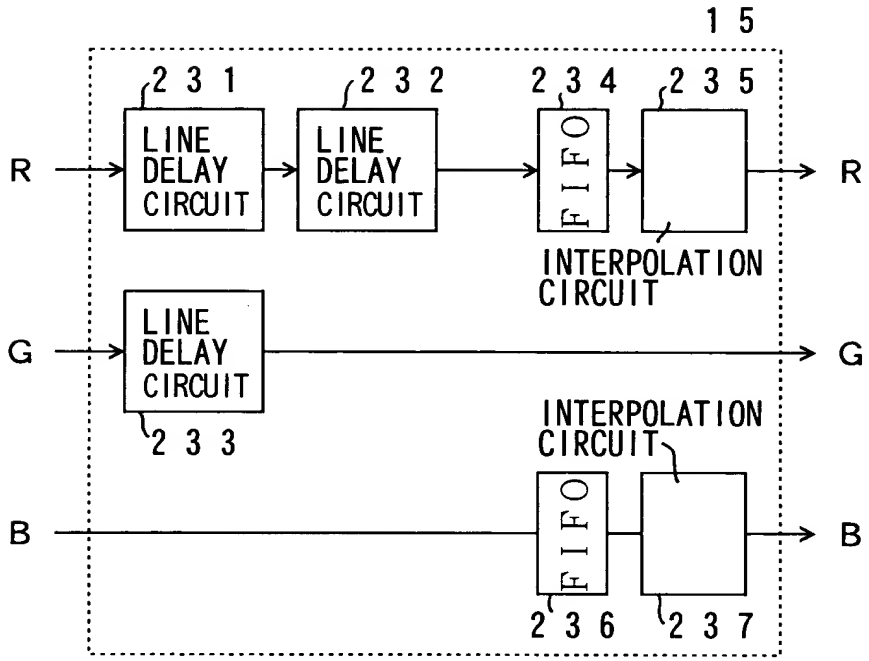

15
231
232
234
235
R
LINE DELAY CIRCUIT
LINE DELAY CIRCUIT
FIFO
R
INTERPOLATION CIRCUIT
G
LINE DELAY CIRCUIT
G
233
INTERPOLATION CIRCUIT
B
FIFO
B
236
237

Fig. 27

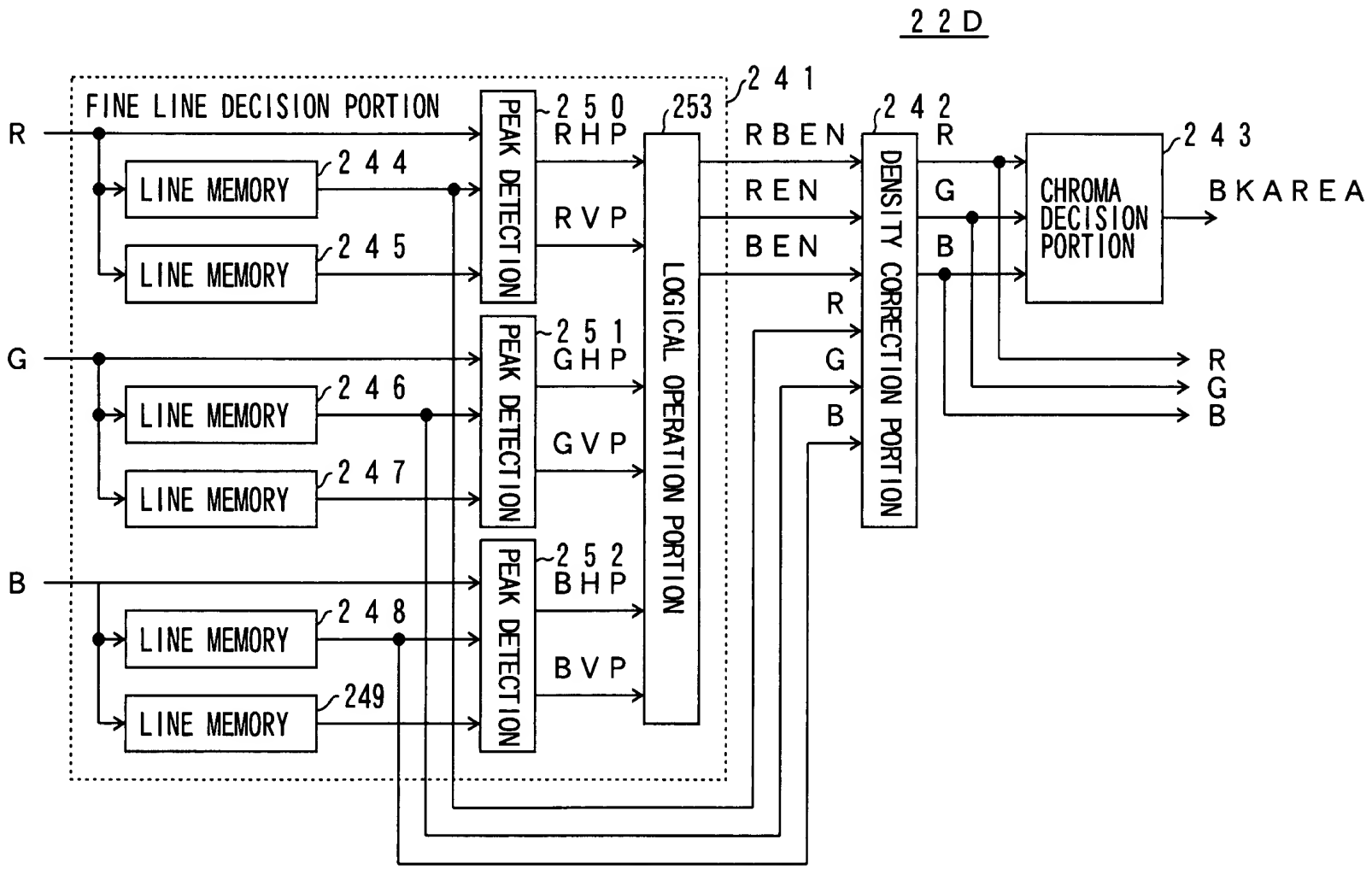

22D
FINE LINE DECISION PORTION
R
G
B
LINE MEMORY
244
245
246
247
248
249
PEAK DETECTION
250
RHP
RVP
251
GHP
GVP
252
BHP
BVP
253
LOGICAL OPERATION PORTION
241
RBEN
REN
BEN
R
G
B
242
DENSITY CORRECTION PORTION
R
G
B
243
CHROMA DECISION PORTION
BKAREA
R
G
B

Fig. 28

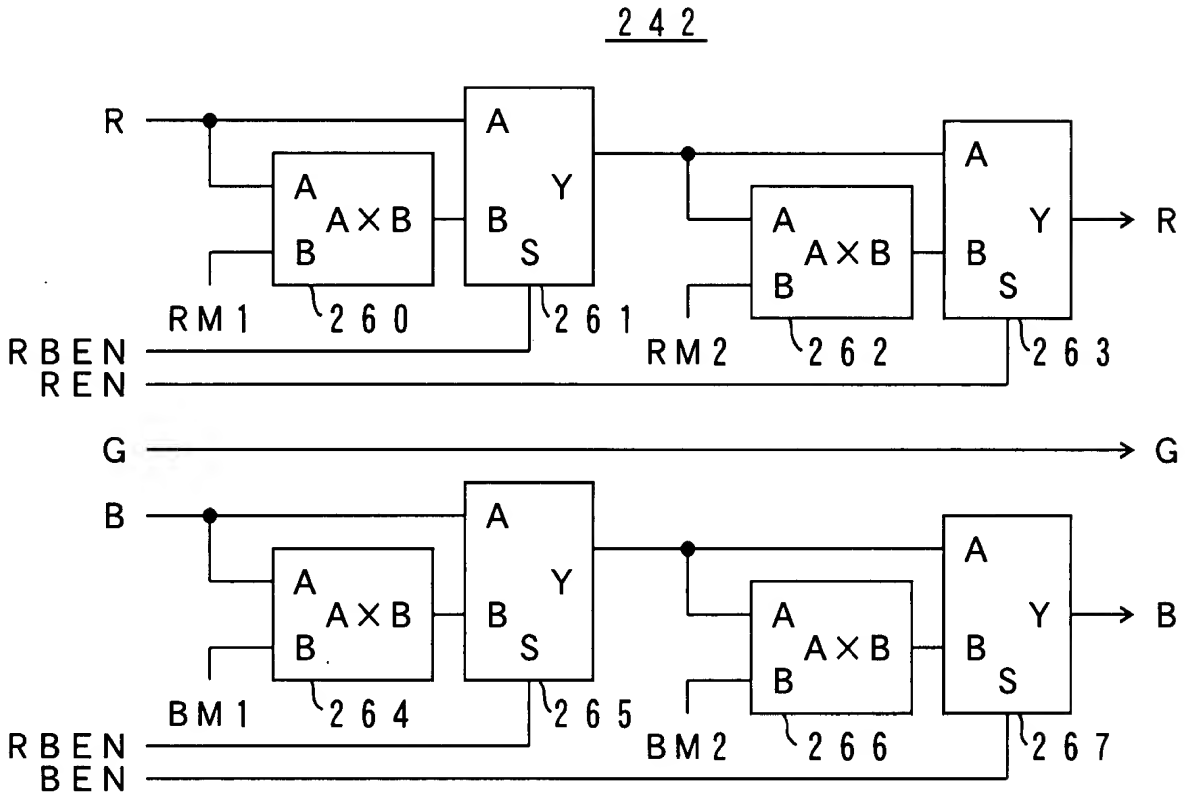

242
R
A
A×B
B
Y
S
RM1
260
261
RM2
262
263
R
RBEN
REN
G
G
B
BM1
264
265
BM2
266
267
B
RBEN
BEN

Fig. 29

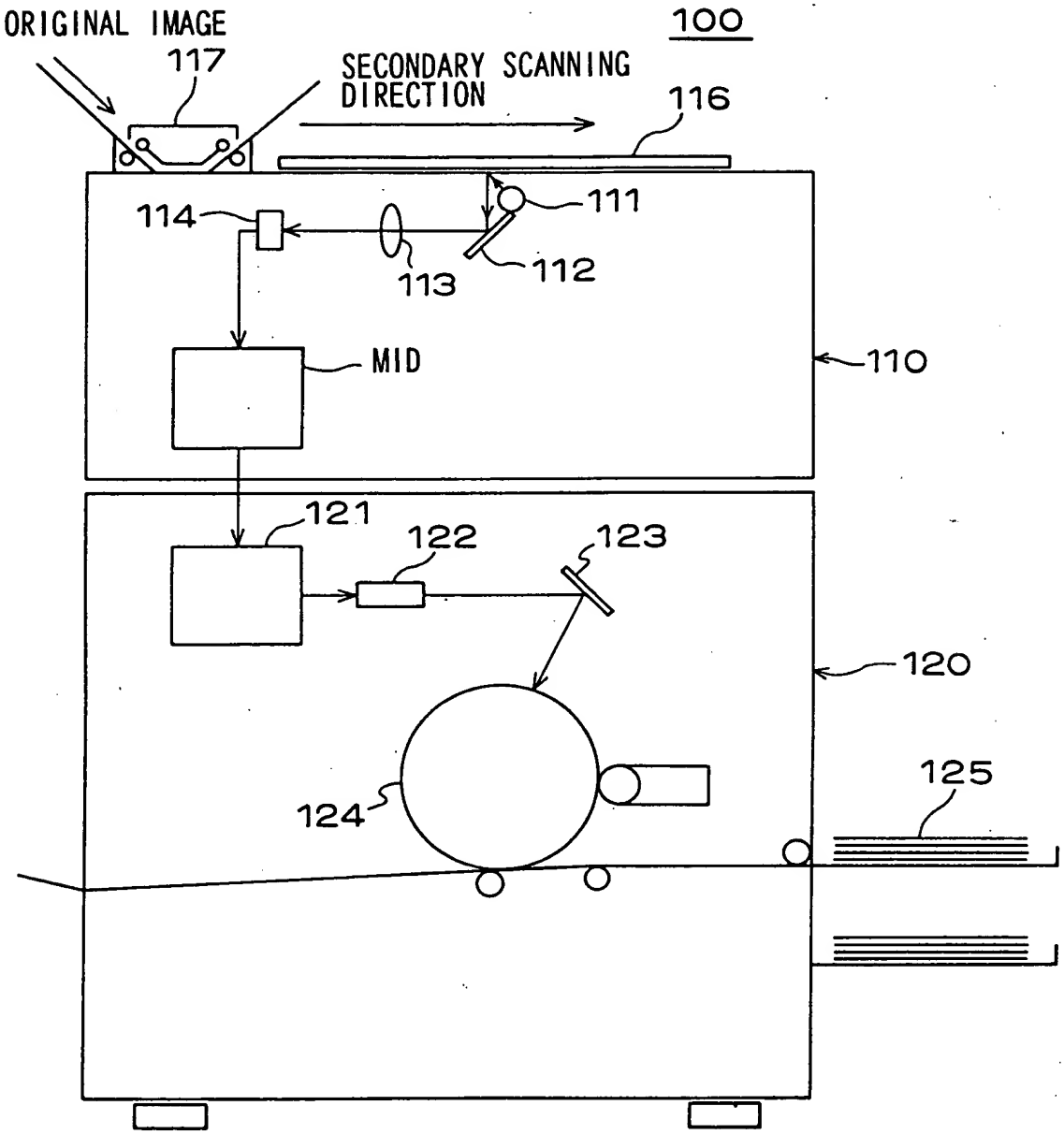

ORIGINAL IMAGE
117
SECONDARY SCANNING DIRECTION
100
116
111
114
113
112
MID
110
121
122
123
120
124
125

Fig. 30

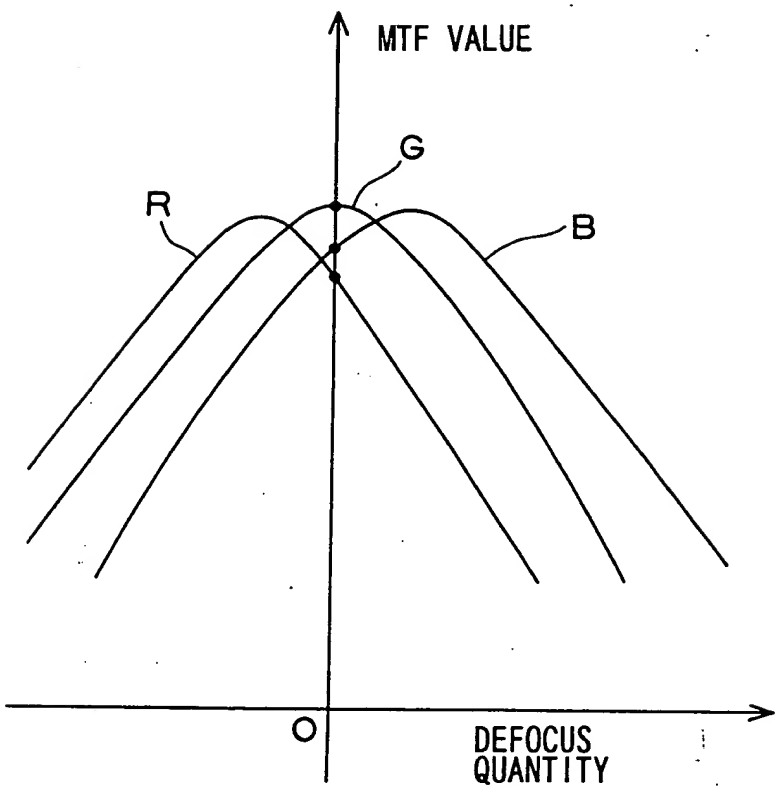


Fig. 31

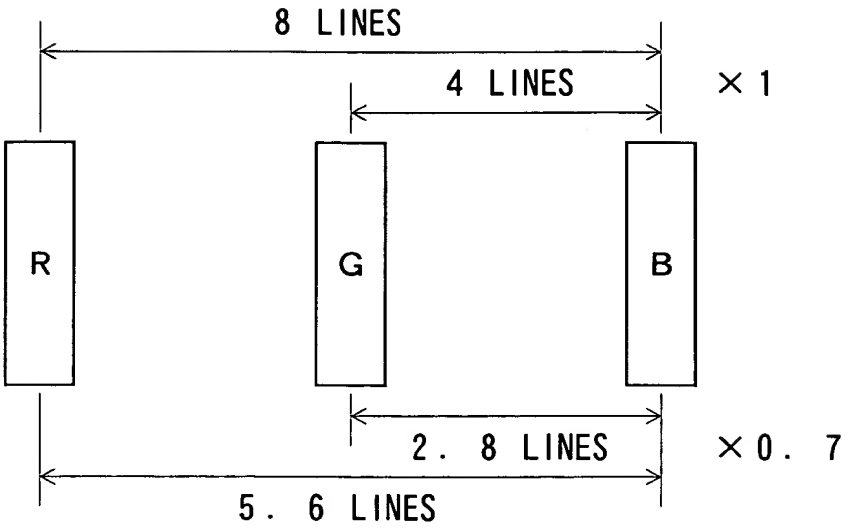


Fig. 32

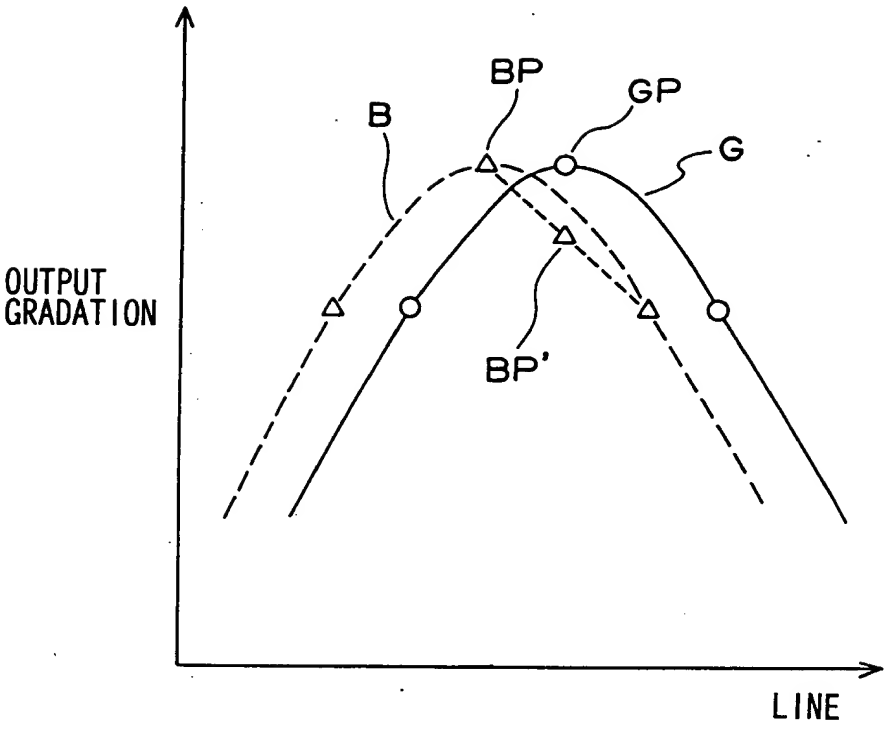
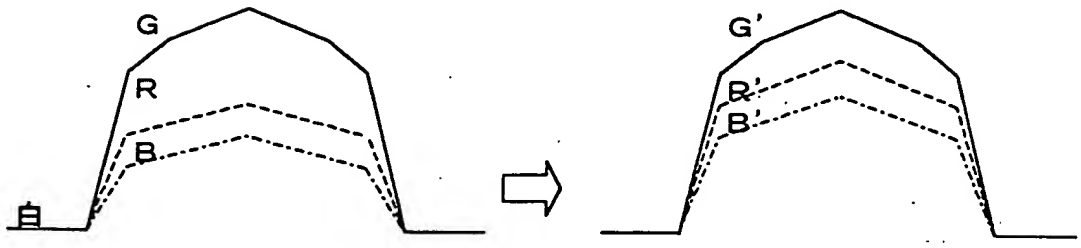



Fig. 33